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ABSTRACT

This paper examines the effectiveness of increasing the confidence of preservice teachers in using technology for personal and instructional purposes as a result of participating in an introductory educational technology course offered at the University of Virginia's Curry School of Education. Course participants attended sections designed for specific content areas--elementary, secondary humanities, and secondary math/science. Pre- and post-survey instruments were given to course participants, measuring personal confidence (22 items) and instructional confidence (21 items) using technology. A modified version of an instrument developed by Dawson (1998) was used to gather data. Factor analyses were performed to group items into like factors, followed by repeated measure analysis of variance to test for significant differences. Results indicate that students' confidence levels significantly increased, across all factors, as a result of taking the course. Difference in content areas was found only for one factor of personal confidence, i.e., using spreadsheets and databases. (Contains 23 references.) (Author/MES)

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Technology in Teaching: Just How Confident are Preservice Teachers?

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Abstract: This paper examines the effectiveness of increasing confidence of preservice teachers in using technology for personal and instructional purposes as a result of participating in an introductory educational technology course offered at the University of Virginia's Curry School of Education. Course participants attend sections designed for specific content areas – Elementary/P.E., secondary Humanities, and secondary Math/Science. Pre- and post-survey instruments are given to course participants, measuring personal confidence (22 items) and instructional confidence (21 items) using technology. A modified version of Dawson's (1998) instrument was used to gather data. Factor analyses were performed to group items into like factors, followed by repeated measure analysis of variance to test for significant differences. Results indicate that students' confidence levels significantly increased, across all factors, as a result of taking the course. Difference in content areas was found only for one factor of personal confidence – using spreadsheets and databases.

Introduction/Purpose

The National Council for Accreditation of Teacher Education (NCATE, 1997) and the International Society for Technology in Education (ISTE, 1999) have reported that schools of education are not adequately preparing its preservice teacher education students to effectively integrate technology in their future classrooms. Despite the educational technology standards that have been developed for teachers by international, national, and state organizations, Willis and Mehlinger (1996) suggest that part of the problem is a lack of universal agreement regarding what teachers should know or how teachers should be prepared. NCATE describes the problem as "deficiencies" (p. 7), which are a lack of hardware and software, limited faculty knowledge and skill in using technology, and scarce resources (money to invest in technology). To genuinely integrate technology into preservice teacher education programs requires system-wide change, initiative, and time. Cooper and Bull (1997) contend that teacher educators supporting change need "to be realistic about the time frame that will be required to accomplish this [integration of technology] in the depth that may be eventually desired" (pg. 101).

Many schools of education are in the process of restructuring their programs to better meet the needs of its preservice teacher education students. For example, the University of Virginia's Curry School of Education, recognized for its leadership in integrating technology for over a decade, has been participating in a number of endeavors to more effectively infuse technology into its instructional program. One of its efforts was the establishment of the Center for Technology and Teacher Education (CTTE) in 1997; a goal of the CTTE is to prepare preservice teacher education students to be educational technology leaders. To cultivate these leaders, the CTTE promotes the integration of technology into methods courses and requires all of its preservice teacher education students to complete a two-credit introductory technology course, EDLF 345, *Introduction to Educational Technology*. Unlike most stand-alone technology courses, EDLF 345 incorporates content-specific instruction in utilizing technology. Grouping students into three different areas of emphasis – Elementary, secondary Humanities, and secondary Math/Science – allows instructors to design classes that move beyond mastery of basic technology skills to instruction that encourages students to think of how technology can be used in instructional practice.
A trend witnessed throughout the Curry School has been the increased technological competence of incoming students in recent years. However, students possess a wide repertoire of technological skills and experiences varying from novices, advanced users, and a myriad of others somewhere in between. Adapting to the needs of the expanding range of students is recognized by the CTTE as pivotal in its efforts to continue to be a leader in integrating technology into preservice teacher education. In order to assess

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these needs, a pilot study instrument was administered to the students of EDLF 345 in the fall semester of 1998 to gauge prior technology training, usage, attitudes, and confidence towards using technology, both personally and for instruction. By quantifying these attributes, the Curry School expects to provide a better learning experience as well as determine if students are meeting state and NCATE technology standards.

Purpose

Due to length of paper considerations, this paper primarily explores the results of the confidence portions of the pre- and post-survey instrument given to the participants of an introductory educational technology course. The confidence portions of the instrument contain one portion measuring confidence in instructional use of technology while another portion measures confidence in personal use of technology. The confidence portion of the instruments serves as the basis for this paper because developing confidence in preservice teachers is the first step in preparing them to use technology in their teaching (Mager, 1992; Olivier & Shapiro, 1993). The purpose of the study was to:

- Pilot an instrument aligned with the Virginia Technology Standards for Instructional Personnel (Virginia Department of Education, 1998),
- Gather baseline data about students' backgrounds and attitudes about using technology,
- Determine whether the course affected students' personal and instructional confidence in using technology, and
- Determine whether different content areas tended to display different levels of confidence.

Design and Methodology

After consulting with program faculty and researching other existing instruments (Atkins & Vasu, 1998; Becker, 1994; Dawson, 1997; Delcourt & Kinzie, 1993; Trushell, 1994; Moersch, 1999), the authors chose to utilize a modified version of Dawson's (1998) survey. It was chosen because it specifically addressed the Virginia Technology Standards for Instructional Personnel (Virginia Department of Education, 1998). By 2002, all preservice teacher education students in the state of Virginia will need to demonstrate proficiency in these standards. Using such an instrument would provide information that could be used in demonstrating such proficiency. In addition, two tested instruments (Delcourt & Kinzie, 1993; Becker, 1994) were used in its development. Participants were undergraduate and graduate students enrolled in EDLF 345 at the University of Virginia's Curry School of Education during the fall semester of 1998. The pre- and post-survey instruments, examined the following areas as outlined in Table 1:

Table 1

Pre- and Post-survey Items

Pre-Survey	Post-Survey
1. Student demographics	7. ---
2. Previous computer instruction (8 items)	8. ---
3. Current use of technology (10 items)	9. Current use of technology (10 items)
4. Attitudes towards using a variety of technology (10 items)	10. Attitudes towards using a variety of technology (10 items)
5. Confidence in instructional use of technology (21 items)	11. Confidence in instructional use of technology (21 items)
6. Confidence in personal use of technology (22 items)	12. Confidence in personal use of technology (22 items)

Most of the pre- and post-survey items required answers in a 4-point Likert scale format, with responses ranging from Strongly Disagree (1) to Strongly Agree (4). The items being explored in this paper, numbers five and six, used the 4-point Likert scale format.

The design for the study was the one-group pretest-posttest design (Campbell & Stanley, 1963). The pre- and post -surveys were administered to 95 undergraduate and graduate students enrolled in four different sections of EDLF 345. Data reported here reflect pre- and post-surveys from 81 students who completed both instruments (pre and post) and signed informed consent forms allowing the researchers to report their data. The demographic information collected in the survey included gender, year in the Curry School (the Curry School has a five-year teacher education program), major, and area of concentration in the Curry School. Participants were also asked about any prior technology courses or experiences. Data were entered into and analyzed using the statistical software program, SPSS.

Principal axis factor analyses were performed to summarize data related to the post-survey items for both confidence portions of the instrument (see Table 1, numbers 5 and 6). After items were grouped into factors, reliability analyses were performed on the items in each factor.

A one-within, one-between repeated measures analysis of variance design was used to test for significant changes in confidence among course participants. Questions of interests were:

1) Does personal and instructional confidence using technology increase as a result of taking EDLF 345?
2) Is there a difference in personal and instructional confidence using technology between content areas?

From these questions, several Null Hypotheses were made:

Null Hypothesis 1: There will be no significant change in instructional confidence using technology across all factors.
Null Hypothesis 2: There will be no significant change in personal confidence using technology across all factors.
Null Hypothesis 3: There will be no significant difference in instructional confidence using technology between different content areas across all factors.
Null Hypothesis 4: There will be no significant difference in personal confidence using technology between different content areas across all factors.

A repeated measure analysis of variance design was used to test for significant changes in confidence among course participants.

Results

Factor Analyses/Reliability

For the Confidence in Instructional Use of Technology items (21 items), four factors were obtained from the factor analysis. Reliability coefficients were calculated for the items in each factor. The results of these analyses are found in Table 2.

Table 2

Confidence in Instructional Use Factors and Reliability Coefficients

Factor	Factor Label	Number of items	Reliability (α)
Factor 1	Instructional Technology Use to Select, Evaluate, and Use Technology Tools in Planning and Delivering Instruction	7	.8953
Factor 2	Instructional Technology Use to Teach Students to Effectively Find and Use Electronic Data/Information	6	.8648
Factor 3	Instructional Technology Use to Teach Students General Technology Terms and General Technology Use	5	.8334
Factor 4	Instructional Technology Use to Use Technology in Constructivist Ways	3	.7523

For the Confidence in Personal Use of Technology items (22 items), six factors were obtained from the analysis. Reliability coefficients and factors are summarized in Table 3.

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Table 3

Confidence in Personal Use Factors and Reliability Coefficients

Factor	Factor Label	Number of items	Reliability ()
Factor 1	Personal Technology Use in Using Mindtools (Spreadsheets, Databases)	4	.8902
Factor 2	Personal Technology Use to Operate a Computer	3	.8787
Factor 3	Personal Technology Use to Explain Technology Tools or Use New Technology Products	7	.8088
Factor 4	Personal Technology Use to Explain and Understand Legal and Ethical Issues of Technology	2	.6929
Factor 5	Personal Technology Use to Use and Create Internet Resources	4	.7644
Factor 6	Personal Technology Use to Use a Word Processor and E-mail	2	.5564

Repeated Measure ANOVA

In instructional confidence, significant main effect differences were found for all factors (< .01), allowing for the rejection of Null Hypothesis 1. However, no significant differences in confidence were found between content areas (> .05) preventing the rejection of Null Hypothesis 3. Table 4 presents the results of the analysis of variance tests for instructional confidence:

Table 4

Confidence in Instructional Use ANOVA (Main Effects and Interaction)

All Students	F Value	Significance	Across Content Areas	F Value	Significance
Factor 1	F = 223.03	= .00	Factor 1	F = 1.42	= .25
Factor 2	F = 132.6	= .00	Factor 2	F = .247	= .78
Factor 3	F = 84.52	= .00	Factor 3	F = .47	= .63
Factor 4	F = 91.76	= .00	Factor 4	F = .61	= .55

In personal confidence, significant differences were found for all factors (< .01), allowing for the rejection of Null Hypotheses 2. Slightly different from the instructional confidence interactions, a significant difference in personal confidence between content areas was found for Factor 1: Using Mindtools (Spreadsheets, Databases) (< .05), allowing for the rejection of Null Hypothesis 4 for Factor 1 only. The following table presents the results of the analysis of variance tests for personal confidence:

All Students	F Value	Significance	Across Content Areas	F Value	Significance
Factor 1	F = 216.79	= .00	Factor 1	F = 4.57	= .01
Factor 2	F = 24.74	= .00	Factor 2	F = 1.84	= .17
Factor 3	F = 219.36	= .00	Factor 3	F = 3.09	= .05
Factor 4	F = 23.36	= .00	Factor 4	F = .77	= .47
Factor 5	F = 157.81	= .00	Factor 5	F = .29	= .75
Factor 6	F = 22.64	= .00	Factor 6	F = .31	= .73

Table 3 – Personal Confidence ANOVA

Discussion of Results

As expected, the participants of EDLF 345 experienced significant increases in personal confidence in using technology. Typically, if someone is shown how to do something and also given the opportunity to practice doing it, they will feel more confident when they must do that thing in the future. While it was the desire of the authors to see a significant increase in instructional confidence in using technology, expectations were not as high as with personal use. Since the instrument was not given to the participants of EDLF 345 until after the class was divided into content-specific sections, it is not known whether this had an impact on the significant increase in instructional confidence witnessed in the data. However, it is of the opinion of the authors that offering content-specific sections of the course did indeed play a role in increasing instructional confidence. Giving preservice teachers the opportunity to work independently and collaboratively on technically oriented content-specific projects early in the teacher education program, provides them with a lens to view technology as an instructional tool for several years before they become inservice teachers.

In looking at the graphs of interaction that existed between content areas for Factor 1, several things were noticed. The Math/Science preservice teachers tended to score higher at the pretest level for items in this factor – using mindtools (spreadsheets, databases) – than other content areas. This is to be expected considering the more frequent use of spreadsheets and databases in mathematics and science. This suggests that spreadsheets and databases can be introduced at a more advanced level to the math/science section of EDLF 345 than with the other sections. Interestingly, Elementary preservice teachers scored higher at the posttest level for items in Factor 1 than other content areas. It is speculated that, while students in the elementary sections of the course typically knew less about spreadsheets and databases at the time of the posttest than other content areas, they learned more relative to their starting point than the other content areas. They therefore felt a higher sense of accomplishment with these tools, ultimately increasing there level of confidence of using these technologies.

The Next Step

The instrument has also been administered to the 1999-2000 participants of EDLF 345 and will be administered at least through the 2000-2001 academic year. Pretest results will be compared from each year to determine whether previous technology training, usage, attitudes, and confidence towards using technology is increasing each year for each incoming class as hypothesized. Closely examining this trend will play a major role in the evolution of EDLF 345.

More importantly is the need to track the relationship between confidence and genuine implementation into the teaching arena. It is possible that preservice teachers experience a "technological high" after completing an introductory technology course, but as they proceed through their methods courses, student teaching, and teaching career experiences their confidence dissipates. Several studies have shown results similar to the results found in this study (Gunter et al, 1998; McInerney et al, 1990; Okinaka, 1992; Von Holzen et al, 1990), but few if any studies have continued to track these preservice teachers into the teaching field. It is planned to have this instrument administered to last year's EDLF 345 course participants again after they have completed their fourth-year methods courses, and once again after student teaching (in their fifth year). In addition, it is hoped that qualitative data, in the form of interviews and teaching observations will provide added insight to the most important question as to how well preservice teachers are incorporating technology into their future classrooms.

Educational Significance

This study is significant to the field of teacher education in several ways. It provides baseline data about preservice teacher education students' confidence towards using technology. ISTE (1999) recommends that further research be conducted on where and how preservice teacher education students are acquiring their technology skills. In addition, ISTE's study surveyed deans and faculty of schools, colleges, and departments of education rather than the students in those programs. The results of this study can be used to assist the Curry School of Education in determining whether students have met state technology standards. As the study is carried out during the 1999-2000 and 2001-2001 academic years, by extrapolating current usage trends into future years, the Curry School will be able to forecast the future

technological needs of its preservice teachers. Finally, this study offers research that relates how effective the technology course was in increasing students' technology skills and confidence, key factors that will influence whether they use technology in their future classrooms.

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